

REMARKS

Reconsideration of the pending application is respectfully requested on the basis of the following particulars.

1. In the specification

The specification is amended, as shown in the foregoing AMENDMENT TO THE SPECIFICATION, to correct a minor informality. It is respectfully submitted that no new matter is added since the change merely corrects a minor informality.

Entry of the AMENDMENT TO THE SPECIFICATION is respectfully requested in the next Office communication.

2. In the claims

As shown in the foregoing AMENDMENT TO THE CLAIMS, the claims have been amended to more clearly point out the subject matter for which protection is sought.

A. Claim amendments

Claim 1 is amended to clarify that the image is displayed simultaneously at the front and rear surfaces of the film screen, to remove material recitations, and to recite that the light-refracting material has a refractivity of 1.4 or more. It is respectfully submitted that no new matter is added since support for the amendments is clearly found at least in Figs. 11-13 and at least on page 2, lines 30-33, page 5, lines 9-10 and 27-29, page 7, lines 24-25, page 8, lines 4-5, page 11, lines 26-28, and 31-33, and page 12, lines 1-5 of the accompanying description in the specification.

Claims 2-7, and 10 are left unchanged.

Claims 8 and 9 are canceled.

Entry of the AMENDMENT TO THE CLAIMS is respectfully requested in the next Office communication.

B. Claim objections

This objection is rendered moot by the cancellation of claim 9.

3. Cited reference not listed on Form PTO-892

The applicant respectfully requests that U.S. publication no. 2003/0174396, cited on page 2, paragraph 1 of the Office action dated November 24, 2006, be included in a Form PTO-892 in the next Office communication.

4. Rejection of claims 1, 2, and 10 under 35 U.S.C. § 103(a) as being unpatentable over U.S. patent no. 4,323,301 (*Spector*) in view of U.S. publication no. 2003/0174396 (*Murayama et al.*)

Reconsideration of this rejection is respectfully requested on the basis that the rejection fails to establish a *prima facie* case of obviousness with respect to claim 1. The remaining claims depend from claim 1, and are therefore patentable as containing all of the limitations of claim 1, as well as for their respective recited features.

The present embodiments have an object to enable simultaneous display of an image projected from a single projector on front and rear surfaces of a single screen by dividedly displaying the image on the front and rear surfaces of the screen.

The functions and effects of the present embodiments associated with simultaneous display of the image projected from the projector on the front and rear surfaces of the screen are achieved in accordance with refraction and diffusion of the image toward the front and rear surfaces, and thus, simultaneous formation of images on the front and rear surfaces. Such functions and effects are the double-side image formation on the front and rear surfaces of a screen utilizing a single projector, which are completely different from those of conventional screens.

In particular, the present embodiments are characterized in that the screen thereof includes a light-refracting material 2 having a high refractivity such as 1.4 to 3 so that an image incident to the screen is dividedly transmitted and refracted toward the front and rear surfaces of the screen (page 6, lines 19-24 in the specification of the present application).

In accordance with the configuration of the present embodiments accomplishing the above-described object, the content C, particle size B, and refractivity of the light-refracting material 2 and the thickness A of the film screen 1 are appropriately determined such that they organically interact to enable simultaneous display of an image on the front and rear surfaces of the screen.

That is, when the content of the light-refracting material is excessive, the screen has no double-sided display function because transmission of light through the screen is completely prevented. On the other hand, when the content of the light-refracting material is insufficient, the image is completely transmitted through the screen. In the latter case, the screen cannot function as a double-sided display screen enabling simultaneous display of an image on the front and rear surfaces thereof, but can only function as a rear screen enabling display of an image on one of the front and rear surfaces thereof. Otherwise, the screen loses the image display function thereof due to an excessive generation of hot spots.

Meanwhile, when the particle size of the light-refracting material is excessively large, transmission of image light is prevented. In this case, an insufficient refractivity is obtained. For this reason, it is impossible to achieve division of an image toward the front and rear surfaces of the screen.

In addition, when the thickness of the film screen is excessively large, transmission of divided images is prevented. In this case, the screen cannot function as a double-sided display screen capable of displaying an image on the front and rear surfaces thereof.

Even when the content of the light-refracting material is appropriate, the screen cannot function as a screen capable of displaying an image on the front and rear surfaces thereof unless the thicknesses of the light-refracting material and screen are proper.

Thus, in accordance with present embodiments, the content C, particle size B, and refractivity of the light-refracting material 2 and the thickness A of the film screen 1 are appropriately determined such that they organically interact to enable

simultaneous display of an image on the front and rear surfaces of the screen.

A. The cited references do not disclose or suggest every claimed limitation

Reconsideration of this rejection is respectfully requested, in view of the amendment to claim 1, on the basis that the rejection fails to establish a *prima facie* case of obviousness with respect to amended claim 1 because the cited publications fail to disclose or suggest every limitation of amended claim 1.

The *Spector* patent fails to disclose a double-sided image film screen having a light-refracting material having a refractivity of 1.4 or more, and the content of the particle size of the light-refracting material and the thickness of the film screen mutually interact such that an image projected from a single projector is dividedly displayed on the front and rear surfaces of the screen to enable simultaneous display of the image at the front and rear surfaces of the film screen, as required by amended claim 1.

The *Spector* patent discloses a screen which can selectively function as a transmissive screen or a reflective screen in accordance with an arrangement of a projector OP1 or OP2. That is, when the projector OP1 is arranged at the front side of the screen, the screen functions as a reflective screen because an embossed surface of the screen functions as a reflection surface, whereas the projector OP2 is arranged at the rear side of the screen, the screen functions as a transmissive screen in accordance with a translucent synthetic resin of the screen (col. 3, lines 20-26). Thus, the screen of the *Spector* patent functions as a front screen when the projector is arranged at the front side of the screen, and functions as rear screen when the projector is arranged at the rear side of the screen. Accordingly, the viewer can view an image displayed only on the front or rear surface of the screen by selectively arranging the projector at the front or rear side of the screen. In accordance with the *Spector* patent, it is impossible to simultaneously view an image displayed on the screen at the front and rear sides of the screen.

That is, the surface of the screen in the *Spector* patent, namely, the reflection

surface, is lustrous in a forward direction, but is lusterless in a rearward direction. For this reason, when the projector OP1 is arranged at the front side of the screen of the *Spector* patent, the light projected from the projector is shielded by the lustrous reflection surface. As a result, it is impossible to view an image at the rear side of the screen in the *Spector* patent.

On the other hand, when the projector OP2 is arranged at the rear side of the screen in the *Spector* patent, light projected from the projector passes through the rear surface material of the screen, namely, translucent synthetic resin, so that it is transmitted toward the reflection surface. As a result, at the front side of the screen, it is possible to view only an image projected from the rear projector OP2 through the transmissive screen.

Meanwhile, at the rear side of the screen, it is impossible to view an image because the image passes through the translucent resin, and is not reflected from the screen.

Furthermore, the design of the *Spector* patent is an impractical technique because, when the image projected from the projector OP2 at the rear side of the screen is viewed at the front side of the screen, its light is substantially shielded by the reflection surface of the screen, so that the brightness of the image is very low.

Thus, the *Spector* patent fails to disclose a double-sided image film screen having a light-refracting material having a refractivity of 1.4 or more, and the content of the particle size and the thickness of the film screen mutually interact such that an image projected from a single projector is dividedly displayed on the front and rear surfaces of the screen to enable simultaneous display of the image at the front and rear surfaces of the film screen, as required by amended claim 1.

This is in contrast to the pending embodiments, which provide a screen enabling simultaneous display of an image projected from a single projector on front and rear surfaces of a single screen irrespective of an arrangement direction of the projector (namely, irrespective of whether the projector projects an image at the front side of the screen or at the rear side of the screen).

The *Murayama* publication fails to disclose a double-sided image film screen having a light-refracting material, and the content of the particle size of the light-refracting material and the thickness of the film screen mutually interact such that an image projected from a single projector is dividedly displayed on the front and rear surfaces of the screen to enable simultaneous display of the image at the front and rear surfaces of the film screen, as required by amended claim 1.

The *Murayama* publication provides a transmissive screen which displays an image projected at the rear side of the screen, to enable the image to be viewed at the front side of the screen. Accordingly, the structure and function the *Murayama* publication are different from the screen of amended claim 1, which enables simultaneous display of an image at the front and rear surfaces of the screen.

That is, the *Murayama* publication relates to a rear projection screen which includes a first light diffusion layer 1 and a second light diffusion layer 2 so that the second light diffusion layer 2 performs a transmission function, and the first light diffusion layer 1 performs a diffusion function, thereby achieving an enhancement in light transmission efficiency (paragraphs [0050] and [0051]).

There is simply no disclosure in the *Murayama* publication relating to simultaneously displaying an image from a single projector on both the front and rear surfaces of a projection screen, as required by amended claim 1.

Further, the *Murayama* publication is characterized by a double layer structure including a first base material and a second base material. The first base material (first light diffusion layer) has a thickness of 50 to 200  $\mu\text{m}$ , and the second base material (second light diffusion layer) has a thickness of 500 to 5,000  $\mu\text{m}$  such that the total thickness of the layer structure is 550 to 5,200  $\mu\text{m}$ . Since the screen of the *Murayama* publication has such a large thickness, it is not a film screen.

Additionally, with respect to claim 2, the screen of the present embodiment has a thickness A of 10 to 400  $\mu\text{m}$ . Accordingly, the *Murayama* publication fails to disclose the specific thickness of a film screen, as required by pending claim 2.

The rejection also points out that, although the content of the light-refracting material in the present invention is 800 to 90,000 ppm (0.008 to 9 weight %) is different from that of the *Murayama* publication, namely, 20 to 50 weight %, it would have been obvious to one having ordinary skill in the art to make the range of the content of light-refracting material from 800 ppm to 90,000 ppm for the purpose for optimizing the distribution of light for better image quality.

However, the screen of the *Murayama* publication is a transmissive screen, and is very thick in that it has a thickness of 550 to 5,200  $\mu\text{m}$ . If the screen of the *Murayama* publication having such a thickness, namely, a thickness of 550 to 5,200  $\mu\text{m}$ , has a light-refracting material content of 800 to 90,000 ppm as in the present invention, the image transmission rate thereof is degraded because the thickness of the screen is excessively increased. In this case, transmission of an image is prevented, so that the screen of the *Murayama* publication cannot perform the desired transmissive screen function.

On the other hand, if the screen, which has a thin film thickness of 10 to 400  $\mu\text{m}$  as in the pending claim 2, has a light diffusion material content of 20 to 50 weight % as in the *Murayama* publication, light of an image is excessively transmitted through the screen, so that a hot spot phenomenon (F) may occur. When such a hot spot phenomenon occurs, the screen cannot perform the desired screen function.

Also with respect to claim 2, the rejection points out that the particle size of the light-refracting material ranging from 0.1  $\mu\text{m}$  to 50  $\mu\text{m}$  in pending claim 2 falls within the range of 1 to 12  $\mu\text{m}$  in the *Murayama* publication. However, the simultaneous display of an image at the front and rear surfaces of the screen, are obtained only when the refractivity, the particle size of the light diffusion material having relation to the refractivity, the thickness of the screen, and the content of the light-refracting material organically interact, as recited in amended claim 1. Accordingly, although the transmissive screen of the *Murayama* publication has a particle size range overlapping with that of the present embodiments, it cannot obtain the simultaneous display function at the front and rear screen sides as required in

amended claim 1.

Accordingly, since neither the *Spector* patent nor the *Murayama* publication disclose a double-sided image film screen having a light-refracting material, and the content of the particle size of the light-refracting material and the thickness of the film screen mutually interact such that an image projected from a single projector is dividedly displayed on the front and rear surfaces of the screen to enable simultaneous display of the image at the front and rear surfaces of the film screen, as required by amended claim 1, a *prima facie* case of obviousness cannot be maintained and withdrawal of this rejection is respectfully requested.

B. There is no motivation to combine the cited references

Reconsideration of this rejection is respectfully requested on the basis that the rejection fails to establish a *prima facie* case of obviousness with respect to amended claim 1 because there is no suggestion or motivation to combine the cited publications.

As discussed above, the *Spector* patent describes a flexible screen that may be used as either a rear or a front projection screen. Thus, the screen has specific structural characteristics that allow the screen to be used in either configuration.

As also discussed above, the *Murayama* publication discloses only a transmissive rear projection screen that allows the projected image to pass through the screen from a rear surface to the front surface.

Since the screens of the *Spector* patent and the *Murayama* publication have different configurations and are designed to function in different ways, a skilled artisan would not have been motivated to combine the teachings of the *Spector* patent and the *Murayama* publication.

Specifically, there is no suggestion in the *Murayama* publication that the rear projection screen may be utilized as a front projection screen. Thus, a skilled artisan would not have been motivated to provide the features of the screen of the *Murayama*



publication to the screen of the *Spector* patent, which specifically requires that the screen function as both a rear and a front projection screen.

Thus, because a skilled artisan would not have been motivated to combine the cited publications, a *prima facie* case of obviousness cannot be maintained, and withdrawal of this rejection is respectfully requested.

C. There is no reasonable expectation of success

Reconsideration of this rejection is respectfully requested on the basis that the rejection fails to establish a *prima facie* case of obviousness with respect to amended claim because there is no reasonable expectation of successfully combining the cited publications.

As discussed above, the *Spector* patent describes a flexible screen that may be used as either a rear or a front projection screen and the *Murayama* publication discloses a transmissive rear projection screen.

If the structure and features of the *Murayama* publication were combined with the screen of the *Spector* patent, the screen of the *Spector* patent would no longer function as a screen that may be utilized as either a front or rear projection screen, but would merely be suitable as a rear projection screen, as taught by the *Murayama* publication. Thus, the intended use of the screen of the *Spector* patent would be destroyed, since it would no longer function as a front or rear projection screen, but merely as a rear projection screen.

Further, even if the structure and features of the *Murayama* publication were combined with the screen of the *Spector* patent, there is no reasonable expectation that the combination would disclose a double-sided image film screen having a light-refracting material, and the content of the particle size of the light-refracting material and the thickness of the film screen mutually interact such that an image projected from a single projector is dividedly displayed on the front and rear surfaces of the screen to enable simultaneous display of the image at the front and rear surfaces of the film screen, as required by amended claim 1.

Accordingly, since there is no reasonable expectation of successfully combining the features of the *Spector* patent and the *Murayama* publication, a *prima facie* case of obviousness cannot be maintained and withdrawal of this rejection is respectfully requested.

5. Rejection of claims 3 and 4 under 35 U.S.C. § 103(a) as being unpatentable over U.S. patent no. 4,323,301 (*Spector*) in view of U.S. publication no. 2003/0174396 (*Murayama et al.*) and further in view of U.S. patent no. 5,247,499 (*Shopp*)

Reconsideration and withdrawal of this rejection is respectfully requested, in view of the amendment to claim 1, from which claims 3 and 4 depend, on the basis that the *Shopp* patent fails to make up for the shortcomings of the *Spector* patent and the *Murayama* publication, as discussed above.

Specifically, the *Shopp* patent fails to disclose or suggest a double-sided image film screen having a light-refracting material, and the content of the particle size of the light-refracting material and the thickness of the film screen mutually interact such that an image projected from a single projector is dividedly displayed on the front and rear surfaces of the screen to enable simultaneous display of the image at the front and rear surfaces of the film screen, as required by amended claim 1.

Accordingly, withdrawal of this rejection is respectfully requested.

6. Rejection of claims 5 and 7 under 35 U.S.C. § 103(a) as being unpatentable over U.S. patent no. 4,323,301 (*Spector*) in view of U.S. publication no. 2003/0174396 (*Murayama et al.*) and further in view of U.S. publication no. 2003/0107803 (*Tanaka et al.*)

Reconsideration and withdrawal of this rejection is respectfully requested, in view of the amendment to claim 1, from which claims 5 and 7 depend, on the basis that the *Tanaka* patent fails to make up for the shortcomings of the *Spector* patent and the *Murayama* publication, as discussed above.

Specifically, the *Tanaka* patent fails to disclose or suggest a double-sided image film screen having a light-refracting material, and the content of the particle size of the light-refracting material and the thickness of the film screen mutually interact such that an image projected from a single projector is dividedly displayed on the front and rear surfaces of the screen to enable simultaneous display of the image at the front and rear surfaces of the film screen, as required by amended claim 1.

Accordingly, withdrawal of this rejection is respectfully requested.

7. Rejection of claim 6 under 35 U.S.C. § 103(a) as being unpatentable over U.S. patent no. 4,323,301 (*Spector*) in view of U.S. publication no. 2003/0174396 (*Murayama et al.*) and further in view of U.S. publication no. 2003/0163367 (*Piepel et al.*)

Reconsideration and withdrawal of this rejection is respectfully requested, in view of the amendment to claim 1, from which claims 5 and 7 depend, on the basis that the *Piepel* patent fails to make up for the shortcomings of the *Spector* patent and the *Murayama* publication, as discussed above.

Specifically, the *Piepel* patent fails to disclose or suggest a double-sided image film screen having a light-refracting material, and the content of the particle size of the light-refracting material and the thickness of the film screen mutually interact such that an image projected from a single projector is dividedly displayed on the front and rear surfaces of the screen to enable simultaneous display of the image at the front and rear surfaces of the film screen, as required by amended claim 1.

Accordingly, withdrawal of this rejection is respectfully requested.

8. Rejection of claim 8 under 35 U.S.C. § 103(a) as being unpatentable over U.S. patent no. 4,323,301 (*Spector*) in view of U.S. publication no. 2003/0174396 (*Murayama et al.*) and further in view of U.S. publication no. 2001/0005243 (*Yamaguchi*)

This rejection is rendered moot by the cancellation of claim 8.

Application No.: 10/527,715  
Examiner: DO, Robert C.  
Art Unit: 2851

9. Conclusion

As a result of the amendment to the claims, and further in view of the foregoing remarks, it is respectfully submitted that the application is in condition for allowance. Accordingly, it is respectfully requested that every pending claim in the present application be allowed and the application be passed to issue.

If any issues remain that may be resolved by a telephone or facsimile communication with the applicant's attorney, the examiner is invited to contact the undersigned at the numbers shown below.

BACON & THOMAS, PLLC  
625 Slaters Lane, Fourth Floor  
Alexandria, Virginia 22314-1176  
Phone: (703) 683-0500  
Facsimile: (703) 683-1080

Date: February 26, 2007

Respectfully submitted,

/Justin J. Cassell, Reg. #46,205/

JUSTIN J. CASSELL  
Attorney for Applicant  
Registration No. 46,205